ANNUAL REPORT

1961

CITY OF NORTH BAY

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ON THE

CITY OF NORTH BAY

SEWAGE TREATMENT PLANT

OWRC PROJECT - 58-S-10

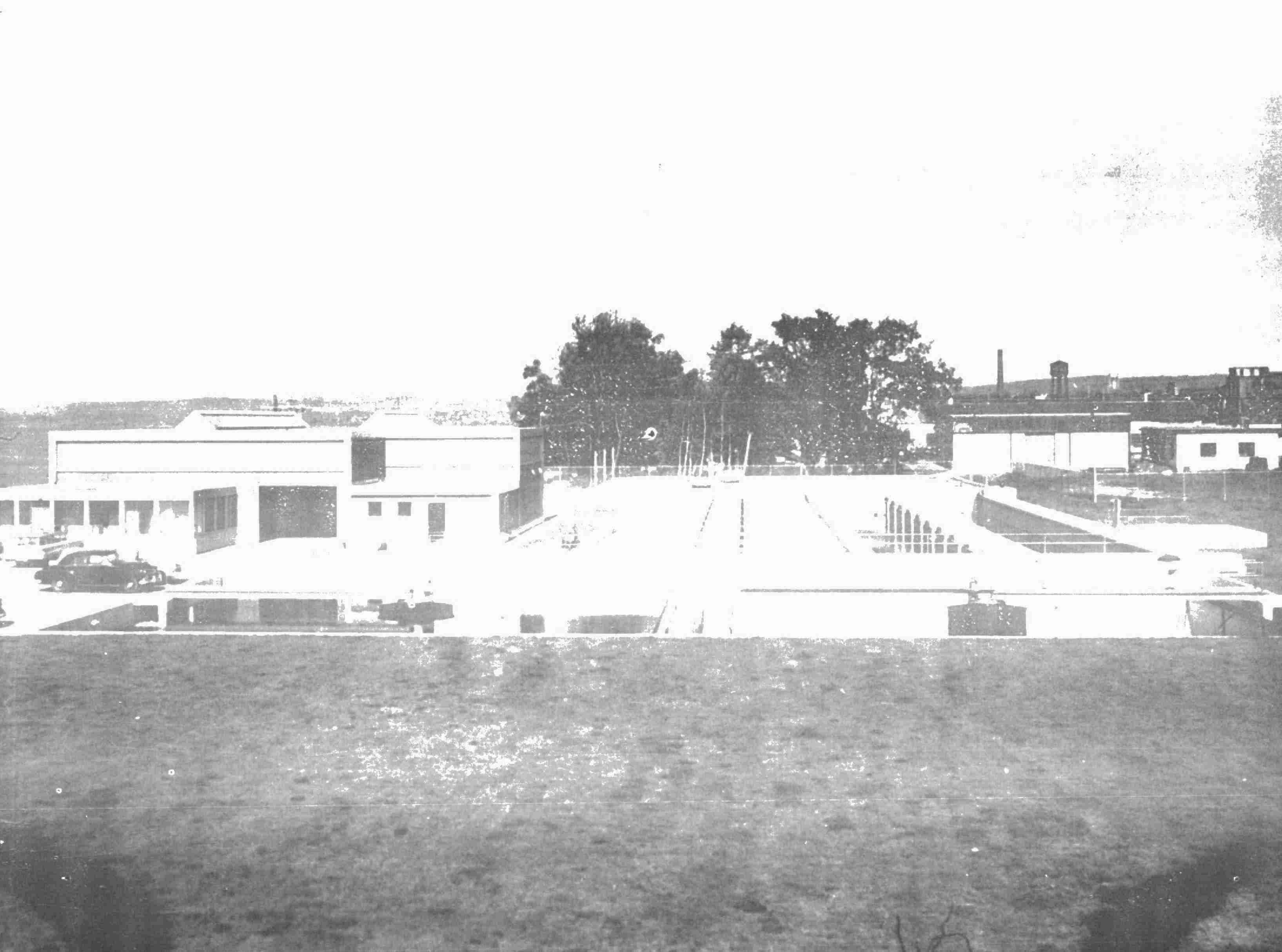
NORTH BAY SEWAGE TREATMENT PLANT

OPERATED FOR

THE CITY OF NORTH BAY

BY

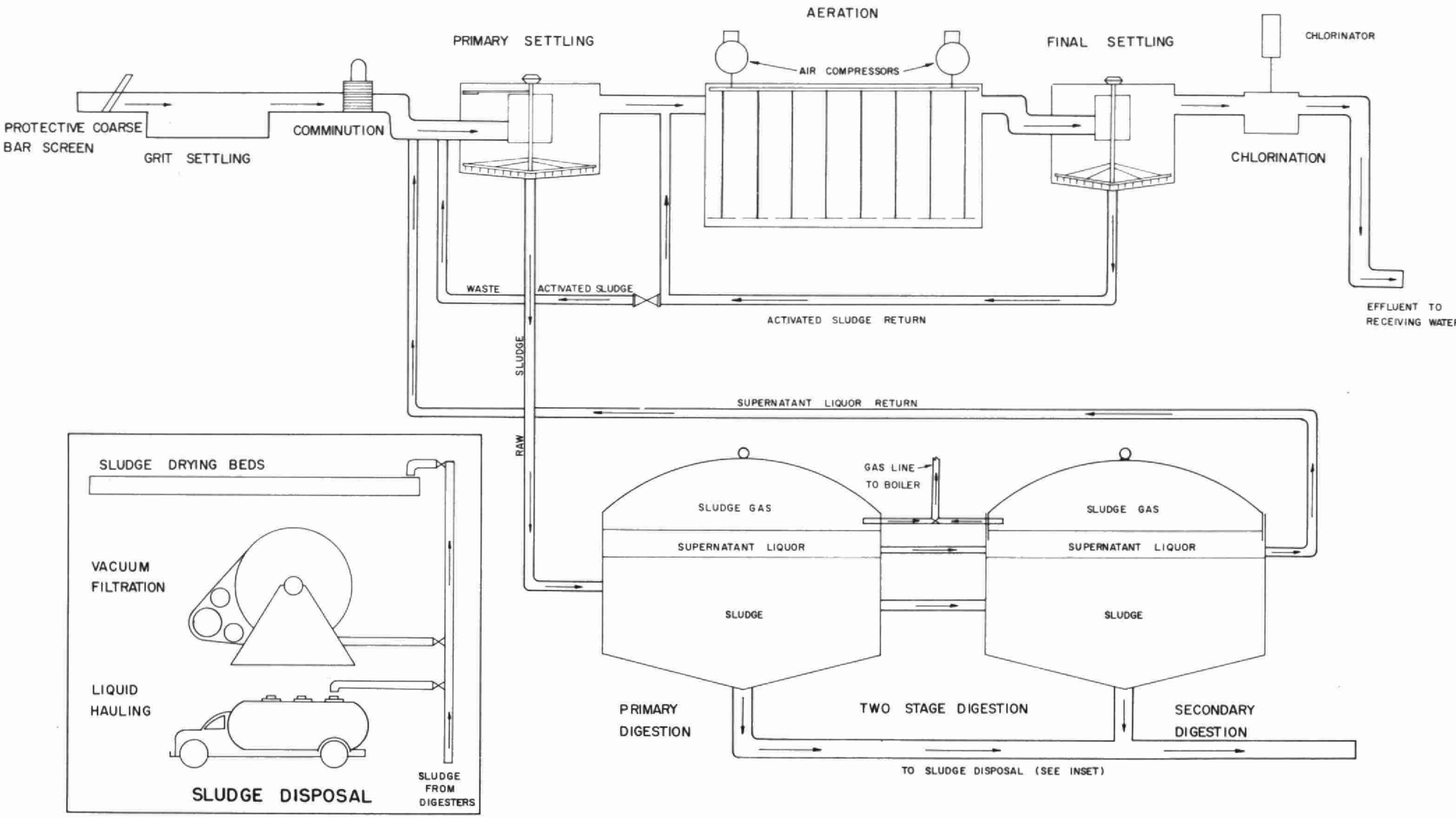
THE ONTARIO WATER RESOURCES COMMISSION



SEWAGE TREATMENT

BY THE

ACTIVATED SLUDGE PROCESS



ONTARIO WATER RESOURCES COMMISSION

GENERAL

In 1956, the City of North Bay approached the Ontario Water Resources Commission to finance, construct and operate sewage treatment facilities in the municipality. After preliminary discussions were held, it was decided that a joint scheme including the townships of West Ferris and Widdifield as well as the City of North Bay would most adequately serve the needs of the area. Accordingly, the consulting engineering firm of Graham Reid & Associates Limited was engaged and plans and specifications were prepared.

At a public hearing of the OMB held Friday, September 26, 1958, approval was given to the integrated sewage works by the OMB.

It was agreed that the division of capital costs would be based on equalized assessment in the areas served. The equalized assessment will be recalculated at three year intervals. Operating costs are to be divided on the basis of actual usage of the system.

The project consisting of trunk sewers, manholes, appurtenances and an activated sludge sewage treatment plant was divided into four different contracts to facilitate construction. Tenders were called and contracts let to the following firms:

Stirling Construction was awarded Contract A which consisted of the construction of the sewage treatment plant, including a West Ferris wet well and outfall sewer.

Beaver Construction was awarded Contract B which included the construction of a trunk sewer and appurtenances from the sewage treatment plant to Timmins Street in North Bay and Midwestern Construction was let Contract C and part of B including the construction of a sanitary trunk sewer on Queen Street from the sewage treatment plant

to Judges Avenue and a sanitary sewer on Queen Street from the sewage treatment plant to Regina Street with manholes and appurtenances.

Midwestern Construction was also awarded Contract D which consisted of a trunk sewer and four lift stations in the municipality of West Ferris.

Construction was substantially completed in the fall of 1960 and the sewage treatment plant put into operation at that time.

PROJECT DESCRIPTION

1. Collection System

   Sewage is collected in the laterals and services of the municipalities' sewerage systems. It flows from the municipalities' systems to the OWRC trunk sewers constructed under project number 58-S-10.

   In West Ferris four underground lift stations and 44,000 feet of asbestos cement sewer pipe transport the sewage to the West Ferris wet well located at the sewage treatment plant. Located near the Judges Avenue lift station is a metering pit consisting of a Parshall flume and stilling well. The flow of sewage is metered and the signal telemetered to the treatment plant where it is recorded.

   The Widdifield and North Bay sewage is collected in trunk sanitary sewers and transported to the plant. The Widdifield sewage is metered at both Norwood and O'Brien Avenues with signals telemetered to the plant.

   The responsibility of the maintenance of the West Ferris pumping stations and the three metering pits has been left with the townships concerned.

NORTH BAY AREA SEWAGE WORKS
SUMMARY OF DIVISION OF ESTIMATED COMPLETED COST
AT CLOSEOFF DATE OF SEPTEMBER 30,1960

	Total	North Bay	West Ferris	Widdifield
Contract A - Sewage Treatment Plant				
General Contract -$793,863.71				
Equipment - 374,523.80	$1,168,387.51	$934,710.01	$139,038.11	$ 94,639.39
Contract B - Trunk Sewers To Serve North Bay & Widdifield	88,308.88	80,096.15		8,212.73
Contract C - Trunk Sewers to Serve North Bay & West Ferris	87,260.80	76,004.16	11,256.64	
Contract D - Trunk Sewer to Serve West Ferris Only	591,767.30		591,767.30	
TOTAL	1,935,724.49	1,090,810.32	742,062.05	102,852.12
Engineering Fees & Expenses	122,227.83	68,936.50	46,813.26	6,478.07
Miscellaneous Expenses	23,246.46	13,111.00	8,903.40	1,232.06
Property Purchase				
Plant Site	129,310.00	103,448.00	15,387.89	10,474.11
Trunk Sewers to Serve North Bay & Widdifield	4,000.00	3,628.00		372.00
Trunk Sewers in West Ferris	4,000.00		4,000.00	
Contingency				
Operations Equipment for Plant	58,000.00	46,400.00	6,902.00	4,698.00
Sewer Maintenance Equipment for West Ferris	7,500.00		7,500.00	
Road in West Ferris	17,500.00		17,500.00	
	2,301,508.78	1,326,333.82	849,068.60	126,106.36
Less: Winter Works Subsidy on Contract B	7,846.95	7,117.18		729.77
	2,293,661.83	1,319,216.64	849,068.60	125,376.59
Add: Capitalized Interest - to September 30, 1960	79,313.71	45,605.38	29,346.07	4,362.26
	2,372,975.54	1,364,822.02	878,414.67	129,738.85

1. Collection System (cont'd)

The sewage from the West Ferris wet well is pumped into an influent manhole where it is combined with the flow from North Bay and Widdifield.

2. Influent Works

From the influent manhole the sewage flows into the influent works where the first degree of treatment is given. Grit is removed in two parallel chambers called detritors. In these two square chambers, the velocity of the sewage is reduced to a point whereby grit and sand will settle out but organics will not. The chambers are equipped with mechanical scrapers which gather the grit into the collector channels located beside the grit chambers. The collector channels are equipped with inclined rectangular dragout conveyors which discharge the grit into 45 gallon drums for removal. The channels are also equipped with organic return pumps for returning to the flow any organic material entering the channels.

Prior to entering the main plant wet well the sewage passes through two griductors which screen and cut the organic solids. The griductors which are located in parallel are equipped with double-ended reversible cutter teeth. In the event that the griductors must be taken out of service for repairs, the plant is equipped with a by-pass channel and coarse bar screen.

3. Primary Clarification

From the wet well the raw sewage is pumped into three primary clarifiers. The sewage is held in these rectangular tanks for a

3. Primary Clarification (cont'd)

specified number of hours to effect the removal of organic suspended solids. The sludge is collected in the bottom of the tanks by means of a travelling scraper. The sludge collectors are mounted on carriages which travel back and forth on rails running the length of the tank. On the forward pass the sludge scraper collects sludge to one end of the tank and, on the return pass, grease is skimmed from the surface.

On the bottom and at one end of each tank are located two sludge hoppers into which the travelling scrapers deposit the settled solids. Each hopper has one draw-off line equipped with a motorized valve. Sludge is drawn off at regular intervals.

The scum skimmers remove the surface scum from the tanks and deposit it into the scum aprons from which it is pumped to the digester.

The settled sewage flows over the effluent weirs to the aeration section.

4. Raw Sludge Thickening Pit

The sludge from the primary clarifiers can be pumped to a thickening pit where excess water is removed before pumping it to the digester. Some pumping modifications are being effected to make better use of this tank.

5. Aeration and Final Clarification

Settled sewage from the primary clarifiers enters the aeration section of the plant where it is mixed with activated sludge from

5. Aeration and Final Clarification (cont'd)

the final settling tank. The resultant mixed liquor is carefully controlled in order that the proper environment required for the growth of biological communities or "sludge flocs" is maintained. Air is interjected into the tank through spargers. Two blowers powered by gas engines which utilize digester gas provide the air required in the aeration section. Air can be provided at the rate of 1.35 cubic feet per gallon.

The floc, so produced in the aeration section, is actually a food centre. The bacteria require both food and oxygen to exist. The food is provided by the sewage entering from the primary clarifier and the air is the oxygen source. A balance must be maintained between the actual number of bacterial communities and the amount of incoming food. Should this go out of balance two results are possible. Firstly, if there is more sewage than can possibly be absorbed by the activated sludge communities a septic condition will develop. On the other hand, if the incoming sewage is weak, the bacteria communities become starved and commence devouring one another. This results in a condition usually referred to as nitrification. Normally there is quite a high reduction in BOD but the final effluent contains a tiny pin point floc. To counteract both of these extreme conditions continual control is maintained on the aeration section by means of a routine sampling procedure. From the test results, the variables are adjusted to establish optimum conditions in this section.

From the aeration section the mixed liquor flows to the final settling tanks where the settleable solids are removed.

5. Aeration and Final Clarification (cont'd)

Two circular tanks provide final clarification. The settled solids are collected on the bottom of the tank by means of submerged rotary sludge collectors. The sludge is returned to the aeration section where it is instrumental in the activated sludge process.

The clear sparkling effluent after flowing over the weirs is collected in the launders and directed to the chlorine contact chamber.

6. Chlorine Contact Chamber

The final effluent prior to leaving the plant is chlorinated during the summer months as required by the Sanitary Engineering Division of the OWRC. The chlorine contact chamber is a circular tank which provides a retention period of 25 minutes for disinfection purposes. The chlorinated final effluent leaves the plant and flows out the outfall sewer to be discharged to Lake Nipissing, 1000 feet from shore.

7. Digestion

The raw sludge is pumped from the primary settling tank to the sludge thickening pit (when in service) and then to the primary digester. The sludge digestion in this plant is of the anaerobic alkaline process. Of the two digesters, the primary digester receives the raw sludge. The heat in this unit is maintained at around 90 degrees Fahrenheit. The digester is continually mixed. It is in the primary digester that the greatest proportion of sludge stabilization is achieved. The sludge passes through

7. Digestion (cont'd)

the acid stage to the methane gas producing stage. During this process vast amounts of combustible methane gas are produced. This gas is used to heat the digesters and also as fuel for the gas engines which drive the blowers.

Sludge is transferred from the primary digester to the secondary digester where concentration of the solids is effected. The solids are pumped from the bottom of the secondary digester to a waiting tank truck for disposal. Supernatant is returned from the secondary digester to the primary settling tank.

DESIGN CRITERIA

1. General

   (a) Type of Plant - Activated sludge process

   (b) Design Population - 50,000 persons

   (c) Design Plant Flow - 4.0 mgd

   (d) Per Capita Flow - 80 Imp. gallons/capita/day

   (e) 5 day BOD of Raw Sewage - 150 ppm

   (f) Removal - 85%

2. Primary Treatment

   (a) Grit removal

      2 parallel units

      11.5' x 11.5' x 2.0' liquid depth

      volume - 3300 gallons

      retention at design flow - 1.2 minutes

      velocity - 163 fps

      type of unit - Walker type CRG grit collector with dragout collector and organic return pump

2. Primary Treatment (cont'd)

(b) Screening

2 griductor comminutors (size 24, type C) to screen and cut normal sewage solids to pass through 3/8" slots at a maximum flow rate of 4.05 mgd with a head loss of approximately 7".

Bar screen on by-pass channel

(c) Sewage Lift Pumps

Raw sewage pump well - 37' x 15' x 12' liquid depth

Pumps - 2 - 4 mgd gas powered units

1 - 4 mgd electric powered unit

(d) Primary Clarifiers

3 rectangular units

size 90' x 30' x 10'

Volume - 505,000 gallons (total)

Retention at design flow - 3.0 hours

Surface settling rate - 500 gallons/square foot of tank/day

Weir overflow rate - 44,000 gallons/lineal foot of weir/day

Sludge and grease collectors - Hardinge Clarifier Mechanisms

3. Secondary Treatment

(a) Aeration Section

Number of units - 4 single pass

Size - 185' x 20' x 12' liquid depth

Total volume - 1.1 mg

Aeration period - 5.31 hours @ 1.25 dry weather flow

Air supply - 1.35 cu. ft./gal.

Type of aeration - diffused air

5 day BOD load on aeration tanks - 4200 lbs./day

3. Secondary Treatment (cont'd)

(b) Final Settling Tank

Number of units - 2

Size - 60' x 60' x 11' liquid depth

Volume - 500,000 gallons

Retention at design flow - 3 hours

Surface settling rate - 550 gallons/sq. ft. of tank/day

Weir overflow rate - 8,000 gallons/lineal foot of weir length/day

Sludge collectors - Walker type RSX circular collectors

(c) Chlorine Contact Chamber

1 - circular unit

Size - 34' Ø x 12.5 depth

Volume - 71,000 gallons

Retention - 25 minutes

1 - 1000 feet 36" Ø outfall

Retention - 16 minutes

Total retention - 41 minutes

Chlorinator - 500 # scale BIF semi-automatic machine

(d) Outfall Works

1000 feet of 36" Ø steel pipe

(e) Digestion System

Digesters - 2, one floating cover

Size - 65' Ø x 21.0 liquid depth

65' Ø x 22.3' liquid depth

Volume - first stage - 70,000 cu. ft.

second stage - 74,000 cu. ft.

3. Secondary Treatment (cont'd)

(f) Per Capita Loading

$$\frac{144{,}000}{50{,}000} = 2.9 \text{ cu. ft./capita}$$

Mixing - 3 Dorr 5 HP draft tube mixers with reverse mechanisms

PLANT OPERATIONS

The plant is staffed by a superintendent and six operators. Two of the operators are responsible for the electrical and mechanical maintenance with the remaining four operators being on shift. There are three shifts per day giving the plant 24 hour supervision daily.

Operators are required to do all grounds and building maintenance as well as ensure a high quality of plant effluent.

Each operator has spent time in the plant's laboratory and, when operating on the day shift, is required to do the following tests.

1. Settleable solids - raw sewage
2. Dissolved oxygen - raw sewage
3. Settleable solids - primary effluent
4. Dissolved oxygen - aeration mixed liquor
5. Suspended solids (ppm) - aeration mixed liquor
6. Settleable solids (%) - aeration mixed liquor
7. Sludge Index (Mohlmann)
8. Settleable solids - final clarifier
9. Dissolved oxygen - final clarifier
10. Chlorine residual - chlorinated final effluent

Weekly tests are done on the digester volatile acids, pH of supernatant, pH of digested and raw sludges.

All of these tests are of extreme help to the operator in running his plant; primarily the mixed liquor suspended solids, sludge volume index and aeration tank dissolved oxygen, which assist in maintaining the balance of food organisms and aerobic bacteria essential to the activated sludge process.

Weekly samples are sent to the OWRC laboratory in Toronto for analysis.

A summary of some of the more important test results is to be found in the section entitled "Operating Data".

At the close of 1961 the plant staff consisted of:

1. S. Healey - Superintendent
2. A. Gauthier - Operator-Electrical Maintenance
3. W. Sutherland - Operator-Mechanical Maintenance
4. G. Gerbasi - Operator
5. R. LePage - Operator
6. G. Sevigney - Operator
7. G. Smith - Operator

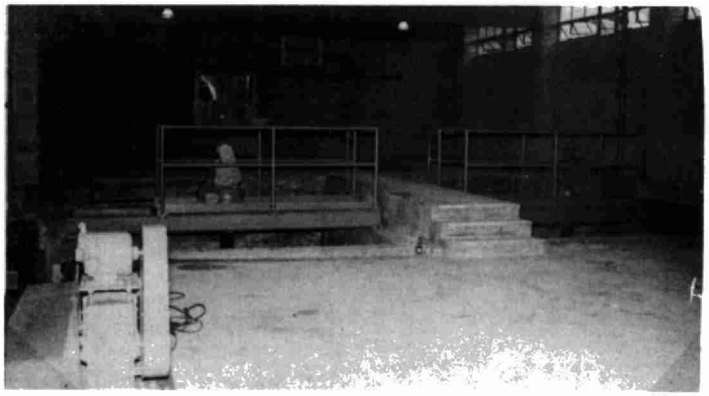
In September of 1961 Mr. S. Toye was transferred from the operating staff of the North Bay plant to be superintendent of the Richmond Hill Sewage Treatment Plant. Mr. Sevigney was hired as Mr. Toye's replacement.

The plant staff was supplemented by casual labour during part of the summer for grounds maintenance and other overload jobs.

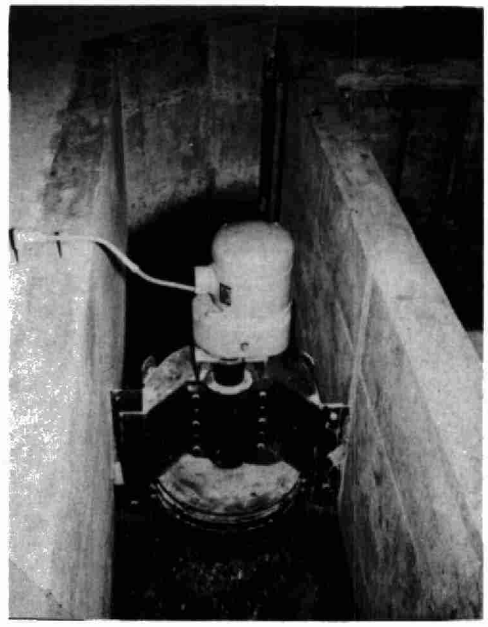
The operation of the project is supervised by the Division of Plant Operations which makes periodic inspection visits. The Electronics, Maintenance and Training Sections of the Division assisted in rectifying plant problems. All of these services, as well as other OWRC head office services, are at no charge to the municipality.

OPERATING PROBLEMS

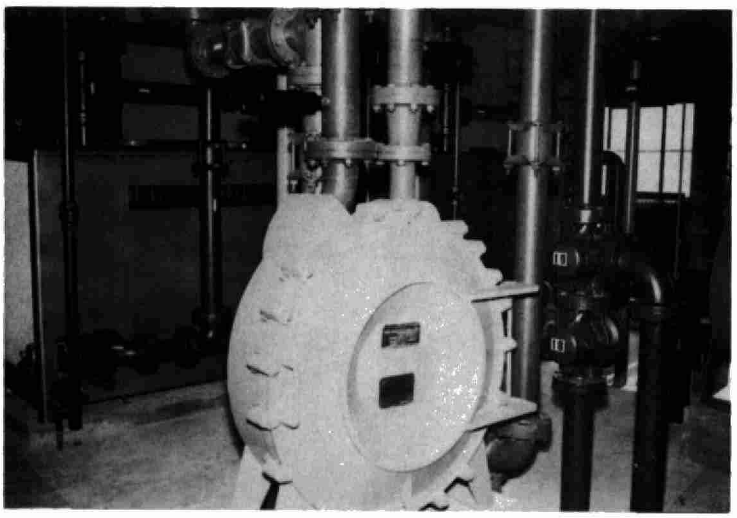
During its first year of operation, the North Bay Sewage Treatment Plant experienced numerous start-up problems which were to be expected in the initial phases of a new plant. The problems were due mainly to mechanical failures as well as the unfamiliarity of most of the staff with sewage treatment plant operation. At the time of the plant start-up,



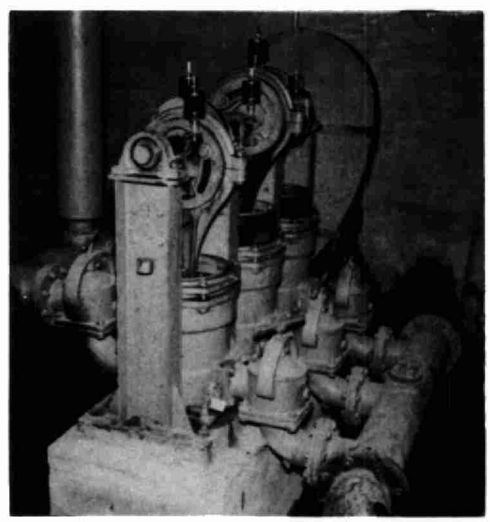
GRIT REMOVAL EQUIPMENT



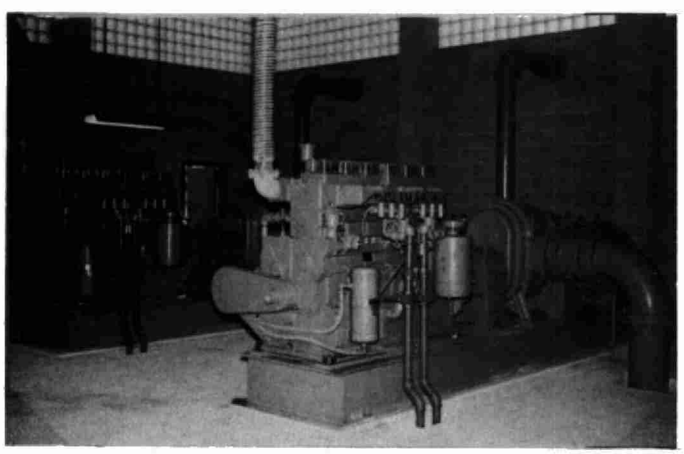
COMMINUTING EQUIPMENT



HEAT EXCHANGER



RAW SLUDGE PUMPS



AIR COMPRESSORS

Mr. S. Healey, the superintendent, was the only operator who had had previous sewage treatment plant experience.

The odour problems which were a nuisance in the early months of 1961 have since been rectified and there has been no occurrence of odour reported in the last half of the year. As the initial mechanical problems have been ironed out and the plant is now functioning as it was designed, the occurrence of future odour problems can be expected to be rare.

In the spring of the year, it was discovered that the outfall sewer was damaged and a hole was located close to shore in about one foot of water. This was subsequently repaired by the contractor.

The problem of floating material reaching the lake through the plant by-pass will no longer be a nuisance factor since the by-pass channel will be equipped with a basket screen.

During the winter operation in 1961, icing was a common problem in the primary clarifiers. Surface ice impeded the progress of the travelling scrapers and icing up of the rails caused the travelling carriage to rack, hence damaging the rails. The problem of surface ice was remedied by the installation of an air supply to each clarifier. Air was bubbled into the sewage at regular intervals about one and one-half feet below the surface. This caused a rolling motion in the liquid adjacent to the tank walls, hence preventing freezing.

The problem of rail icing was somewhat more difficult to solve. Four proposals were made:

1. Anti-freeze directed on the track directly in front of the drive wheel.

2. Propane fuelled flame directed on the track in front of the drive wheel.
3. Heating cables attached to the underside of the rail.
4. Infra-red lamps both front and back of the drive wheel.

The first of these proposals was tried with limited success. The most effective preventative measure was to shut the sludge collectors down during each period of severe icing. The rails could then be cleaned manually and the sludge collector started again when the icing had ceased.

The sludge thickening pit has been out of operation for a considerable period during 1961. The screwpeller pump provided for in the original design did not deliver the suction head required to draw the sludge from the sludge thickening pit to the digester. On the recommendation of Graham Reid and Associates Limited a Simplex Balto Pump has been ordered to replace the screwpeller pump. The screwpeller pump will be relocated next to the triplex raw sludge pump to be used as a stand-by. The addition of the simplex piston pump will facilitate the use of the sludge thickening pit which, in turn, should have the effect of more efficient digestion.

The plant has had difficulty in maintaining an adequate industrial water supply during the winter months. This is due to the low lake level during this period. The industrial water source which is located in the outfall manhole is often below the suction end of the industrial water line at times of low lake level. This has resulted in the use of greater amounts of metered water for cleaning purposes and foam control, hence a further addition to the operating costs of the project. During 1962, a bulkhead will be installed in the outfall manhole which will ensure an adequate pondage of effluent behind it for the industrial water supply.

It is to be expected that the operational problems experienced in the first 1 1/2 years of operation will be minimized in the future. The experience gained by the operators and the minor changes made at the plant should make for trouble-free, efficient operations.

OPERATING DATA

During 1961 the North Bay Sewage Treatment Plant gave complete treatment to approximately 1430 million gallons of sewage. The following tables are a summary of the plant's operations over the year 1961. Included are flow results, performance data, grit removal, power consumption, sludge removal, natural gas consumption, sewage gas production, and chlorine consumption.

TABLE I - Flow Results

Table I indicates the flows treated by the plant over the year. As mentioned previously, the total flow treated was approximately 1430 million gallons. This is only approximate due to the total flow meter having been out of operation for the month of September. The estimated flow for September was based on the average daily flow over the other eleven months. It may be seen from Table I that, during the month of June, the maximum monthly flow occurred. The maximum recorded peak flow to the plant (9.66 million gallons/day) occurred in July and the minimum flow (0.67 million gallons/day) was recorded in February.

The average daily flow over the year was 3.90 million gallons per day.

TABLE II - Loadings and Removals

Table II is a summary of the analysis of strengths of raw sewage and final effluent. The sampling procedure and analysis is carried out as a measure of quality control.

The average sewage strength entering the plant during 1961 was 163 ppm BOD and 240 ppm SS. BOD or bio-chemical oxygen demand is an indication of the oxygen required in the bio-chemical stabilization of the sewage wastes and hence is an indication of the sewage strength. SS refers to the suspended solids in the sewage.

As is indicated in the table, the average final effluent had a BOD of 28 ppm and a SS of 36 ppm. Over the last nine months of the year the BOD value of the final effluent showed a marked improvement in quality and averaged 16 ppm.

The average percent reduction of BOD and SS through the plant during the year was 84.5 and 85.0 percent respectively. The design removal factor was in the range of 85% BOD removal. No figures were given for SS removal.

Graphs I and II give a further interpretation of the quality control. It may be seen that the SS in the final effluent are less than 20 ppm 70% of the time from graph number I. Graph number II is a visual comparison of BOD and SS removals.

The effluent quality during 1961 can be considered satisfactory from the point of view of operations. With the plant now running as it was designed, even a higher degree of effluent quality can be expected.

TABLE III - Operating Data

Table III and graph number III give a summary of the grit removal operations during the year. Six thousand five hundred and seven cubic feet of grit were removed, or 4.56 cubic feet per million gallons of sewage treated. Laboratory analysis of the grit showed that its makeup consisted of less than 25% organics. The remainder consists of coarse particles of sand, gravel, or other minute pieces of mineral matter,

which must be removed to protect the mechanical equipment from abrasive action.

The amount of grit removed per million gallons of sewage is relatively high when compared with grit collected at similar installations throughout North America.

For instance, in 22 municipalities with 50% or more of their sewer system combined, the average grit collected per million gallons of sewage was 2.85 cubic feet, (this figure was compiled from data found in the FSIWA Manual of Practice #8 pages 62 and 63).

This additional load on the plant, which would appear to be due to infiltration in the sewers, is bound to have the effect of increasing the cost of operations both from the point of view of physical disposal and equipment deterioration.

The power consumption at the plant was 413,400 kilowatt hours or 292 KWH/MG of sewage treated. In comparing this to the consumption at other plants the power consumption is considerably lower. This can be attributed to the use of sewage gas as a fuel for driving some of the plant equipment.

TABLE IV - Gas Records

Table IV is a summary of the natural gas consumption at the plant and the sewage gas production. All the sewage gas produced in the digestion process is utilized either for digester heating or as a fuel for the gas engines which drive the blowers. As can be seen from the table, the natural gas consumption has decreased with the increase in production of sewage gas.

The plant produced 7,454,935 cubic feet of methane gas during the year. At an estimated value of 1¢/17 cubic feet of gas, the saving through the utilization of sewage gas was $4,390.00 during

1961. An increased saving can be anticipated in 1962 as the gas production should be considerably higher than the 1961 production.

The average cost of natural gas/MG sewage was $4.62.

Table V - Sludge Removal and Chlorine Consumption

During 1961, 1,665.6 cubic yards of digested sludge were removed by tank truck disposal. The disposal of sludge at the plant is by contract with a local hauler. The contract price for removal of digested sludge at this plant is 0.54 ¢/cubic yard.

The cost of sludge removal in 1961 was $899.42. It can be expected that the daily sludge production at the North Bay plant during 1962 will be in the range of from 15 to 20 cubic yards per day. This will entail an expense of around $10/day or $3650/year.

Chlorination of the final effluent of the plant in 1961 required 25,462 lbs. of chlorine at an average dosage rate of 3.1 ppm.

The recommended chlorine dosage rate of activated sludge plant effluent is between 2 and 8 ppm.

In summary, during 1961, the plant gave complete treatment to 1,430 million gallons of sewage. Nine hundred and sixty-five tons of BOD were removed and 1,460 tons of suspended solids were removed.

TABLE I

FLOW RESULTS

MONTH	TOTAL FLOW (MG)	AVG.DAILY PEAK FLOW RATE	MAX RECORDED PEAK FLOW	AVG DAILY MINIMUM FLOW RATE	MINIMUM RECORDED FLOW RATE	AVG.DAILY FLOW
Jan.	110.155	3.09	3.35	2.21	1.24	3.55
Feb.	99.740	3.22	3.35	1.39	0.62	3.56
March	117.249	3.48	4.35	2.03	1.12	3.79
April	134.014	4.37	5.23	3.35	2.23	4.48
May	138.458	5.80	6.70	2.47	1.24	4.46
June	145.418	6.43	8.32	3.30	0.87	4.85
July	120.513	7.12	9.66	3.30	1.73	3.88
Aug.	144.728	6.00	8.94	3.20	1.49	4.66
Sept.	Meter out	----	----	----	----	----
Oct.	95.895	4.46	6.71	2.46	1.24	3.09
Nov.	89.633	4.54	4.84	2.62	1.24	2.99
Dec.	109.760	4.10	5.09	2.12	0.89	3.65
TOTAL	1430.000	----	----	----	----	----

K&E 1 YEAR BY DAYS X 250 DIVNS. KEUFFEL & ESSER CO. CALENDAR YEAR 358-142 MADE IN U.S.A.

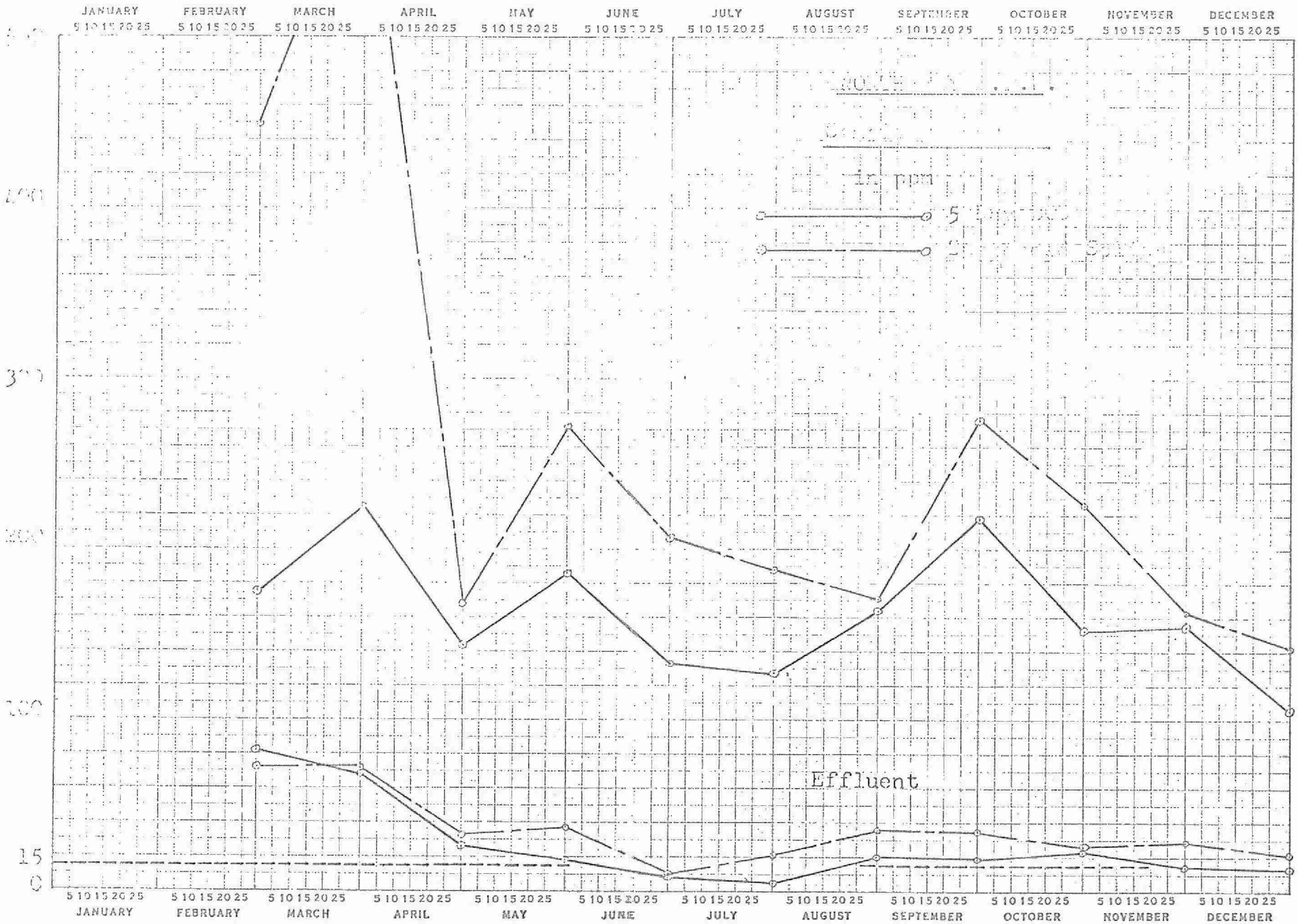


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TABLE II

LOADINGS AND REMOVALS

MONTH	AVERAGE BOD INFLUENT	EFFLUENT	% REDUCTION	AVERAGE S.S. INFLUENT	EFFLUENT	% REDUCTION
JAN.	NO SAMPLES TAKEN THIS MONTH					
FEB.	175	82	53%	450	72	84.0%
MAR.	225	68	70%	602	72	88.2%
APR.	144	26	82%	168	33	80.3%
MAY	186	18	90%	272	37	86.5%
JUNE	133	8	94%	207	15	92.7%
JULY	128	5	96%	188	21	88.9%
AUG.	164	20	88%	171	36	79.0%
SEPT.	218	19	92%	276	35	86.4%
OCT.	153	23	85%	226	26	89.0%
NOV.	155	14	91%	163	29	82.5%
DEC.	106	13	88%	142	21	85.0%
YEARLY AVG.	163	28	84.5	240	36	85.0%

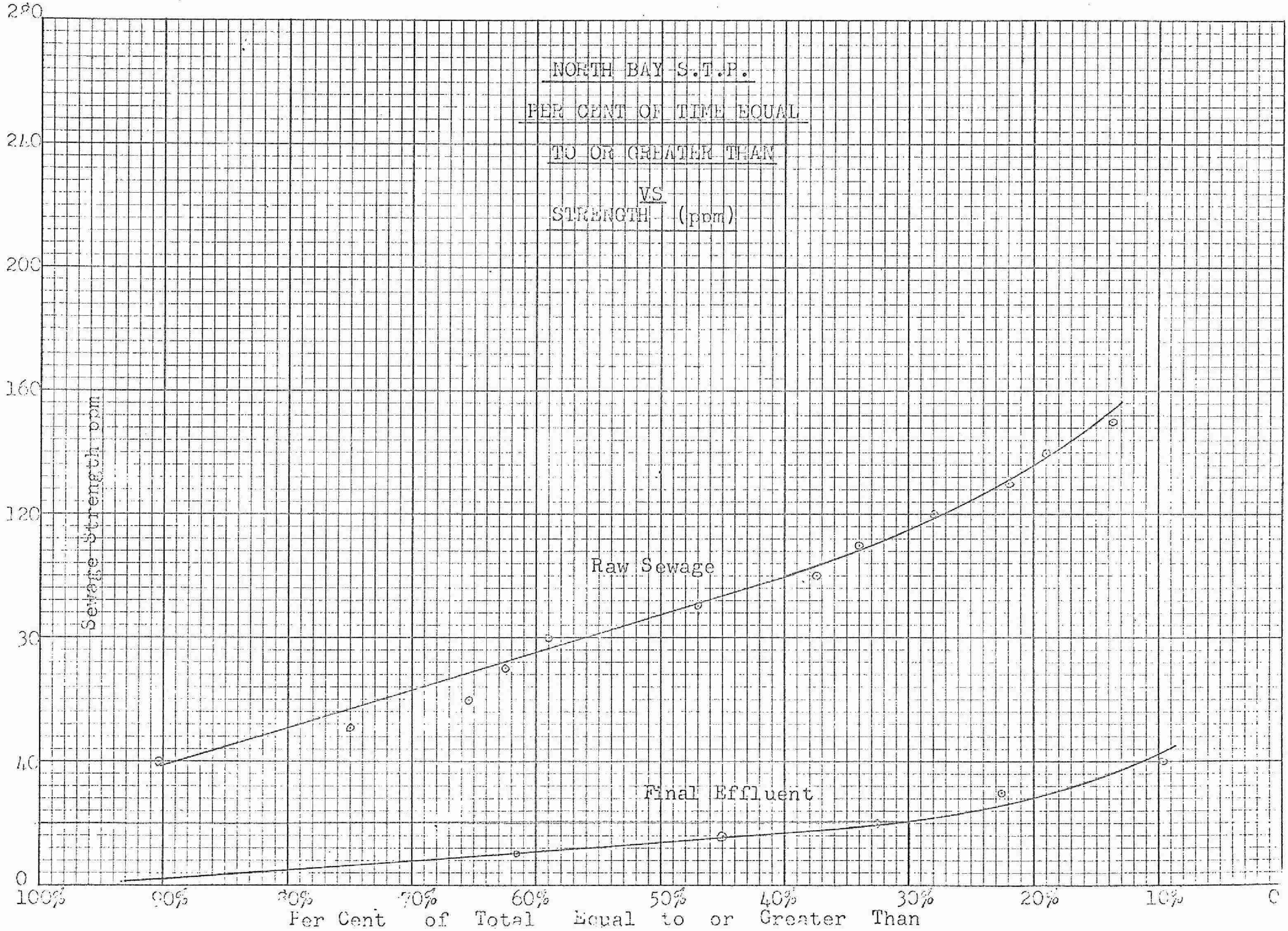
NORTH BAY S.T.P.
PER CENT OF TIME EQUAL
TO OR GREATER THAN
VS
STRENGTH (ppm)
Sewage Strength ppm
Raw Sewage
Final Effluent
Per Cent of Total Equal to or Greater Than

TABLE III

OPERATING DATA

MONTH	TOTAL FLOW MG	GRIT REMOVED (CF)	GRIT (CF) REMOVED PER MG	KWH	KWH/MG
JAN.	110.155	315	2.86	31500	286
FEB.	99.740	207	2.08	30900	310
MAR.	117.249	305	2.59	22200	189
APR.	134.014	585	4.37	59100	440
MAY	138.458	574	4.15	50100	362
JUNE	145.418	564	3.89	28200	194
JULY	120.513	495	4.10	28800	239
AUG.	144.728	866	5.98	36000	244
SEPT.	Assumed 124.438	705	5.67	28500	229
OCT.	95.895	684	7.13	31800	332
NOV.	89.633	463	5.17	34500	385
DEC.	109.760	744	6.77	31800	291
TOTAL	1430.000	6507	AVG. 4.56	413400	AVG. 292

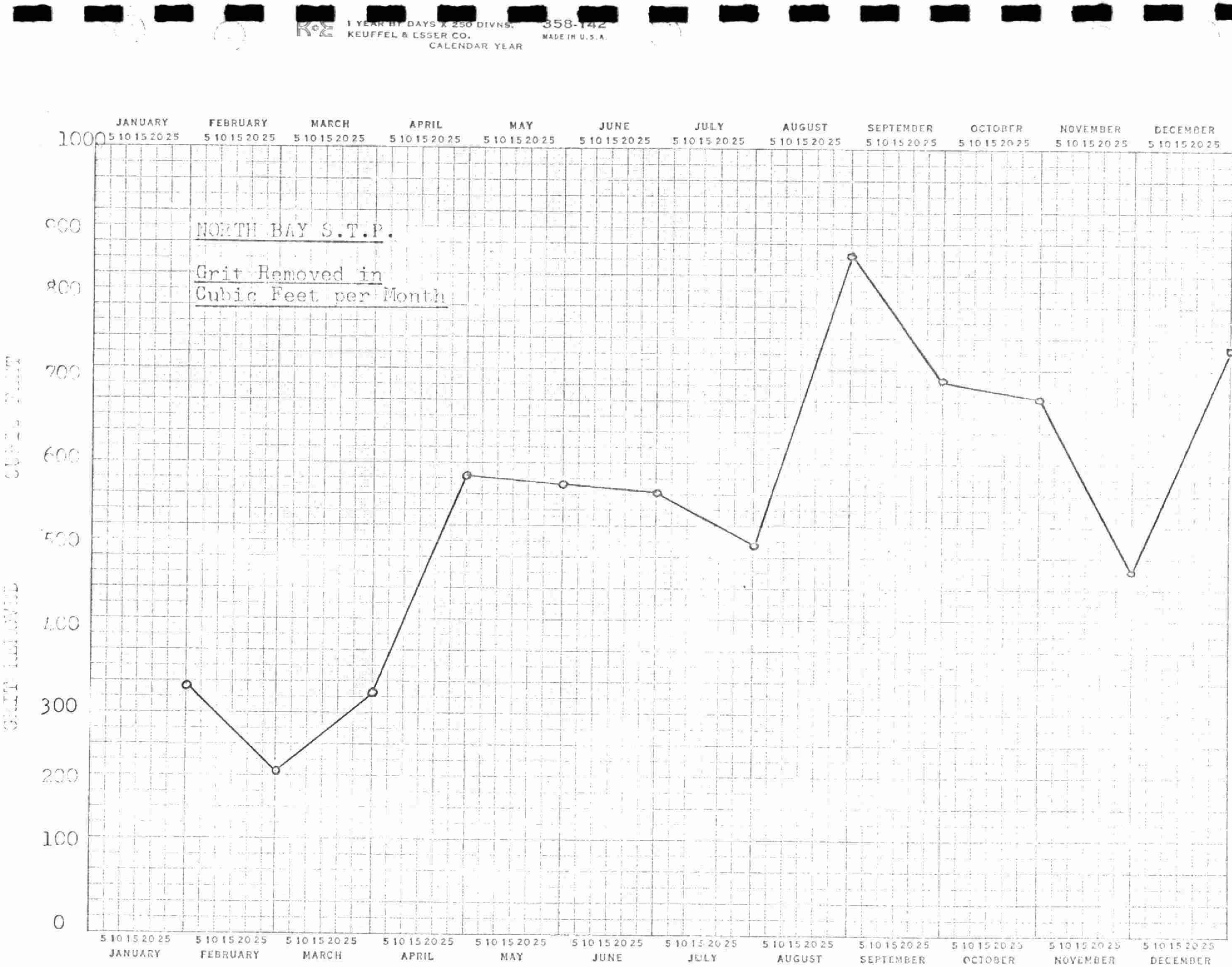
K+E 1 YEAR BY DAYS X 250 DIVNS. KEUFFEL & ESSER CO.
CALENDAR YEAR
358-142
MADE IN U.S.A.
NORTH BAY S.T.P.
Grit Removed in
Cubic Feet per Month
JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER
1000
900
800
700
600
500
400
300
200
100
0

TABLE IV

GAS RECORDS

MONTH	SEWAGE GAS PRODUCED CU. FT.	GAS (NAT.) CONSUMED	GAS EXPENDITURE	MILLION GAL. SEWAGE TRTD.	COST/MG
JAN.	No Rdgs.	131000	$ 899.05	110.155	$ 8.15
FEB.	No Rdgs.	118890	510.35	99.740	5.13
MAR.	No Rdgs.	95020	623.75	117.249	5.30
APR.	693716	109810	606.20	134.014	4.51
MAY	1266745	133150	779.90	138.458	5.63
JUNE	1112141	108815	585.50	145.418	4.02
JULY	650303	53675	404.95	120.513	3.24
AUG.	1020347	55330	404.40	144.728	2.80
SEPT.	677124	74130	452.80		
OCT.	807477	64740	402.75	95.895	4.18
NOV.	793082	65290	464.45	89.633	5.17
DEC.	434000	73740	468.50	109.760	4.28
TOTALS	7454935	965590	6602.60		

TABLE V

SLUDGE REMOVAL AND CHLORINE CONSUMPTION

MONTH	DIGESTED SLUDGE REMOVAL C.Y.	COST OF REMOVAL	CHLORINE CONSUMPTION LBS.	CHLORINE DOSAGE LBS/MG SEWAGE	DOSAGE P.P.M.
JAN.					
FEB.					
MAR.					
APR.					
MAY			4396	31.8	3.2
JUNE			4409	30.3	3.0
JULY			3828	31.8	3.2
AUG.			3503	24.3	2.4
SEPT.	765.0	413.10	4094	32.9	3.3
OCT.	747.0	403.38	3439	44.5	4.5
NOV.	153.6	82.94	1793	20.1	2.0
DEC.					
TOTAL	1665.6	899.42	25462		

OPERATING COSTS

The 1961 Operating Budget and Expenses

Item	Forecast 1961	Actual 1961
Payroll	$22,655	$31,487.32
Fuel	1,400	4,575.05
Power	6,000	12,488.45
Chemical	1,000	3,991.86
General Supplies	700	4,029.90
Equipment	500	1,106.57
Repairs and Maintenance	1,500	1,189.48
Sundry	13,000	16,019.52
Contingency	4,675	
Total	$51,430	$74,888.15

Sundry includes sludge hauling which amounted to $899.42, taxes in the amount of $2,849.72, and insurance in the amount of $5,179.00.

1961 OPERATING DEFICIT

The initial start-up problems at the plant can partially be blamed for the operating costs being more than were anticipated. These problems, with the extra work load, necessitated the hiring of casual labour. The amount paid for casual labour was $4,271.27, which was an unanticipated expense.

A general salary revision at the plant in March of 1961 added an additional expenditure of $1,050.00 to the operating expenses.

The budget for fuel was $1,400.00 and the actual expenditures $4,575.05. As the sewage gas production increased during the last six months of the year, the consumption of natural gas correspondingly decreased.

The sundry figure as mentioned previously contained such items as taxes and insurance At the time the forecast was drawn up, the taxes were not anticipated and a three year insurance premium was not foreseen. Only $1,800.00 was allowed for insurance on the initial forecast. No insurance premium need be anticipated for the next two years. It must be taken into consideration that forecasting the operating costs of a new plant is very difficult. The forecast for 1962 can more reasonably be expected to be a true picture of the operating costs.

The 1962 OPERATING ESTIMATE

Item	North Bay	West Ferris
Payroll	$31,500.00	$
Fuel	6,000.00	
Power	6,000.00	2,000.00
Chemical	4,050.00	
General Supplies	800.00	
Equipment	600.00	
Repairs and Maintenance	1,600.00	200.00
Sludge Haulage	8,000.00	
Sundry	8,100.00	100.00
	$66,650.00	$2,300.00
Contingency	6,350.00	200.00
Total	$73,000.00	$2,500.00

The budget for West Ferris does not include their share of the cost of operations of the sewage treatment plant. This forecast is merely for the operation of the four underground pumping stations located entirely within the township of West Ferris.

SUMMARY OF OPERATING COSTS

1. Per Capita Cost - Population - 38,757 (combined population of three municipalities)

The cost of treatment per capita in the municipalities of North Bay, Widdifield and West Ferris is $1.93.

2. Per Household Cost (3.4 persons per household)

The cost of treatment per household is $6.50.

3. Treatment Costs

Cost per thousand gallons	$ 0.0523
Cost per million gallons	$ 52.30
Cost per day	$205.00
Cost per pound removal of BOD	$0.0388
Cost per pound removal of SS	$0.0587

SUMMARY AND RECOMMENDATIONS

The following items should be incorporated into the plant during 1962. Allowance has been made for these additions before closing off the capital cost of the project.

1. A sludge loading pad should be located at the sludge draw-off line south of the digesters. This installation will make clean-up of the sludge loading area a much easier job, thus eliminating one of the biggest possible source of odours.
2. A basket screen should be installed at the by-pass manhole to remove any floating solids which would otherwise be discharged to Lake Nipissing at times when the incoming flow exceeds the capacity of the plant and use of the by-pass is necessitated.
3. The screwpeller pump located in the digester building basement should be relocated next to the Triplex raw sludge pumps. It

NORTH BAY SEWAGE TREATMENT PLANT

1961 OPERATION STATEMENTS

MONTH	EXPENDI-TURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIR & MAINT.	WATER	SUNDRY
JAN.	3436.26	1974.00		1140.55	259.56		25.57				36.40
FEB.	3818.01	2095.41		940.93	595.51	(549.33)	367.72	123.48			244.29
MAR.	3675.82	2145.12		510.35	716.43		179.17	58.90			65.85
APR.	5338.11	2182.51	234.85	928.82	969.75	(327.03)	343.00	80.30	64.00		861.91
MAY	5947.97	2152.48	447.03	6.63	1609.48	821.09	360.24				551.02
JUNE	6924.31	2055.54	452.09	115.39	1393.07	1414.60	370.27	111.82	230.67		780.86
JULY	8366.34	2152.48	1163.85	124.02	1221.04	2543.49	228.26	102.00			831.20
AUG.	5990.87	3228.72	1073.02	45.67	1102.22	(1003.13)	705.49	110.00	82.30		646.58
SEPT.	6629.65	1858.96	471.04	31.13	1033.93	1472.40	284.93		204.00		1,273.26
OCT.	5027.80	1858.96	429.39	40.70	1101.10	(111.58)	418.52				1,290.71
NOV.	13253.33	1858.96	365.04	670.28	1025.45	396.35	403.86	168.96	408.51		7,955.92
DEC.	6479.86	2831.69	456.18	20.58	1460.91	(665.00)	342.87	351.11	200.00		1,481.52
TOTAL	74888.15	26394.83	5092.49	4575.05	12488.45	3991.86	4029.90	1,106.57	1,189.48		16,019.52

will then be used as a stand-by for raw sludge pumping. The screwpeller pump should be replaced by a Simplex Balto piston sludge pump. This would allow the returning to service of the sludge thickening pit, hence making the control of treatment an easier job.

4. On the recommendation of Smart-Turner Machine Co. Ltd., a 10 HP vari-drive unit was ordered to fit the existing return sludge pump. It will be installed early in the new year.
5. Guard railing should be installed just west of the chlorine contact chamber and the final clarifiers to prevent any automobile from backing into one of these tanks.
6. Venetian blinds should be purchased for the lunchroom, office and entrance foyer of the plant.
7. Sidewalks are required from the control building to the digester building and from the existing sidewalk east of the aeration tanks to the digester building.
8. Additional floodlighting should be included at the plant. Repairs entailing any night work are dangerous under the present conditions.
9. Additional chlorine dosage points should be made in order that pre-chlorination may be effected, as well as chlorination of the return activated sludge. Ton chlorine cylinders should be considered for the 1962 operations. This would affect the cost of operations to a considerably degree and quite a saving could be made.
10. Additional pipe handrails should be installed around the griductor pits, the aeration tanks and between the aeration and final tanks,

as per the Department of Labour's recommendation. The job could be done by the plant staff if they were equipped with an oxy-acetylene torch. The staff has several competent welders and all that is required would be materials.

If these recommendations are implemented in 1962, the operations would be greatly facilitated.

Finally, the North Bay Sewage Treatment Plant has given efficient treatment to the 1430 million gallons of sewage treated in 1961 and has played a leading role in pollution abatement of Lake Nipissing in the North Bay area.